

Express Mail No. EK968023110

We claim:

1. A method for the producing substantially identical microscale metal or metal alloy structures, said method comprising the steps of:
 - (a) fabricating a microscale mold insert having a size and shape that are generally complementary to the size and shape of the desired microscale structures;
 - (b) etching away surface oxides, if any, from the microscale mold insert;
 - (c) coating the microscale mold insert with a bond inhibitor layer;
 - (d) heating a metal plate or a metal alloy plate and the microscale mold insert to a temperature between about 40% and about 90% of the melting point of the plate;
 - (e) pressing the heated plate and the heated microscale mold insert together to form an inverse image of the microscale mold insert in the plate; wherein the inverse image is complementary to the microscale mold insert to an accuracy within about 10 microns;
 - (f) repeating steps (d) and (e) a plurality of times using the same or a different coated microscale mold insert to produce a plurality of substantially identical high aspect ratio microscale metal or metal alloy structures.
2. A method as recited in Claim 1, additionally comprising the step of coating the microscale mold insert with a precursor layer; wherein the precursor layer promotes adhesion between the microscale mold insert and the bond inhibitor-layer.

3. A method as recited in Claim 2, wherein the precursor layer is selected from the group consisting of Ti, Cr, and W.
4. A method as recited in Claim 3, wherein the precursor layer comprises Ti.
5. A method as recited in Claim 1, wherein the bond inhibitor layer is selected from the group consisting of amorphous hydrocarbons, metal-containing amorphous hydrocarbons, amorphous silicon nitrides, metal-containing silicon nitrides, diamonds, metal carbides, metal borides, and metal nitrides.
6. A method as recited in Claim 2, wherein the precursor layer is deposited by sputtering.
7. A method as recited in Claim 2, wherein the precursor layer is deposited by evaporation deposition.
8. A method as recited in Claim 2, wherein the precursor layer is deposited by chemical vapor deposition.
9. A method as recited in Claim 1, wherein the bond-inhibitor layer is deposited by sputtering.
10. A method as recited in Claim 1, wherein the bond inhibitor layer is deposited by evaporation deposition.

11. A method as recited in Claim 1, wherein the bond-inhibitor layer is deposited by hybrid physical/chemical vapor deposition.
12. A method as recited in Claim 1, wherein the metal plate comprise a metal or metal alloy selected from the group consisting of Zn, Al, Al-alloys, Cu, Ni, Fe, and Ni-Fe alloys.
13. A method as recited in Claim 1, wherein the metal plate comprises Al.
14. A method as recited in Claim 1, wherein the metal plate comprises an Al-alloy.
15. A method as recited in Claim 1, wherein the metal plate comprises Zn.
16. A method as recited in Claim 1, wherein the inverse image is complementary to the microscale mold insert to an accuracy of less than about 1 micron.
17. A microscale metal or metal alloy structure produced by the method of Claim 1.